WHAT IS CLAIMED IS:

1. A method of manufacturing a metal-oxide-semiconductor (MOS) transistor, comprising the steps of:

providing a substrate having a gate structure thereon;

forming a source/drain extension region in the substrate on each side of the gate structure;

forming a carbon-containing material layer over the substrate;

etching back the carbon-containing material layer to form a spacer on each sidewall of the gate structure; and

forming a source/drain region in the substrate on each side of the spacer-coated gate structure.

2. The method of claim 1, wherein the step of forming the carbon-containing material layer comprises performing a chemical vapor deposition process.

3. The method of claim 2, wherein gases used in the chemical vapor deposition process comprises ethylene (C_2H_4), hexachlorosilane (HCD), ammonia and nitrogen.

4. The method of claim 3, wherein the flow rate of ethylene is set to a value between 100sccm to 1200sccm in the chemical vapor deposition process.

5. The method of claim 3, wherein the hexachlorosilane to ammonia ratio is set to a value between 2.5% to 8% by volume in the chemical vapor deposition process.

6. The method of claim 3, wherein the flow rate of hexachlorosilane is set to a value between 12sccm to 20sccm in the chemical vapor deposition process.

7. The method of claim 3, wherein the flow rate of nitrogen is set to a value between 300sccm to 1800sccm in the chemical vapor deposition process.

8. The method of claim 3, wherein the chemical vapor deposition process is carried out at a temperature between about 450°C to 600°C.

9. The method of claim 3, wherein the chemical vapor deposition process is carried out at a pressure between 0.2 torr to 2.5 torr.

10. The method of claim 2, wherein the gases used in the chemical vapor deposition process comprises bis(tert-butylamino)silane (BTBAS), oxygen, ammonia and nitrogen.

11. The method of claim 10, wherein the flow rate of the bis(tert-butylamino)silane is set to a value between about 75sccm to 110sccm.

12. The method of claim 10, wherein the bis(tert-butylamino)silane to ammonia ratio is set to a value between 15% to 20% by volume in the chemical vapor deposition process.

13. The method of claim 10, wherein the bis(tert-butylamino)silane to oxygen ratio is set to a value between 10% to 30% by volume.

14. The method of claim 10, wherein the flow rate of nitrogen is set to a value between 110sccm to 200sccm.

15. The method of claim 10, wherein the chemical vapor deposition process is carried out at a temperature set between about 50°C to 600°C.

16. The method of claim 10, wherein the chemical vapor deposition process is carried out at a pressure between 0.2 torr to 2.5 torr.

17. The method of claim 1, wherein the step of forming the carbon-containing material layer comprises:

performing a deposition process to form a material layer over the substrate; and

performing an ion implantation to implant carbon ions into the material layer.

18. The method of claim 17, wherein the deposition process further comprises:

placing the substrate inside a reaction chamber; and

introducing gaseous hexachlorosilane, nitrogen and ammonia into the reaction chamber so that the gases react to deposit material onto the substrate.

19. The method of claim 1, wherein before the step of forming the carbon-containing material over the substrate, further comprises forming an oxide liner layer over the substrate and the gate structure.